

Remarks

Claim 24 has been amended and claims 4, 6 and 7 were previously cancelled. Accordingly, claims 1-3, 5 and 8-26 are currently pending.

I. Amendments:

Claim 24 was amended to recite that the dispersion is predominantly anionic. Support for this claim can be found in the specification at page 8, line 12. No new matter has been added.

II. The Invention:

The present invention relates to an aqueous dispersion useful for internal or surface sizing, as well as preparation and use thereof in the production of paper. The aqueous dispersion includes at least one cellulose reactive sizing agent selected from the group consisting of ketene dimers and multimers, at least one cellulose non-reactive sizing agent (claim 20) and specifically such a sizing agent selected from the group consisting of copolymers of styrene or substituted styrene with at least one other kind of ethylenically unsaturated monomer (claims 1, 5, 8, 17 and 19), and at least one emulsifier selected from the group consisting of oxyalkylene phosphate esters and salts thereof. In other embodiments the dispersion also includes at least one cationic organic compound having a weight average molecular weight less than about 10000 and at least one anionic stabilizer (claim 13), and specifically a cationic organic compound that is a surfactant selected from the group consisting compounds having the general formula $R_4N^+ X^-$ (claim 15) and an anionic stabilizer which is a condensated naphthalene sulfonate (claim 24).

It has been found that effective internal and surface sizing can be achieved by using a dispersion comprising both a ketene dimer or multimer and a cellulose non-reactive sizing agent, and that high stability of such dispersions can be obtained by including a special kind of emulsifier, namely, an oxyalkylene phosphate ester or a salt thereof.

Examples 1 and 2 of the present application show that the present sizing dispersion gives considerably improved sizing efficiency than conventional internal or surface sizes. Examples 3 and 4 further show that the present sizing dispersion has improved stability and particle size distribution, due to the presence of the emulsifier, as claimed.

III. Rejections:

Claims 1-3, 5, 8, 9, 12-15, 17-22 and 26 stand rejected, under 35 U.S.C. §103(a), as being unpatentable over Ceniso et al (US 6,162,328), in view of Dilts et al (US 6,576,049) and further in view of Wendel et al (US 4,051,093). The Applicant respectfully traverses.

Cenesio et al disclose an aqueous surface sizing composition comprising at least one cellulose reactive size that is not solid at 25°C and at least one cellulose non-reactive size. However, Applicants respectfully submits that he is unaware of any disclosure by Cenesio et al of any emulsifier at all being present. It is respectfully submitted that although it is mentioned that sizes generally are used as emulsions or dispersions, this does not suggest or teach that any special emulsifier should be used in addition to the active components. In fact, Cenesio et al teach that the active sizing agents are formed into a dispersion of a starch solution, which also is supported by the Examples in which no emulsifier is added.

Dilts et al disclose a sizing composition comprising ASA, AKD or rosin, an emulsion stabilizer and a hydrophobic substance and optionally a surfactant. Applicant respectfully submits that although ethoxylated phosphate esters are mentioned as a possible surfactant, this is only one of a vast number of different kinds of surfactants recited and there is no suggestion that such a surfactant is particularly suitable for emulsifying ketene dimers or multimers. Moreover, due to the unpredictable nature of dispersion/emulsion chemistry and the fact that the surfactants disclosed by Dilts et al are meant for a specific sizing emulsion that includes specific types of stabilizers and hydrophobic substances in addition to the recited sizing agent, one of ordinary skill in the art would have no reason to pick specifically ethoxylated phosphate esters from the vast list of surfactants and add it to the specific surface sizing composition of Cenesio et al. Further, Applicant is unaware of any disclosure, teach or suggestion by Dilts of polymeric sizing agents, as presently claimed.

Wendel et al disclose a copolymer emulsion which may be used as a sizing agent for paper (column 6, lines 13-14; claim 1). Wendel et al teach that the emulsion does not need an emulsifier, but do disclose a number of conventional cationic, anionic, amphoteric and non-ionic emulsifiers (column 5, lines 2-24) that can be optionally included. If nevertheless present, Wendel et al teach that cationic emulsifiers are preferred. Although alkyl phosphates are mentioned, this is only one of a vast number of different kinds of surfactants recited. Further, there is not the slightest indication that any of the emulsifiers mentioned could be used for a dispersion comprising ketene dimers or multimers. Moreover, Applicant is unaware of any disclosure, teaching or suggestion by Wendel et al of a combination of a cellulose reactive sizing agent selected from ketene dimers or multimers and a cellulose non-reactive sizing agent, as presently claimed.

The Office Action contends that it would have been obvious to use the claimed styrene co-polymers as the non-cellulose reactive sizing agent in the composition and method of

Cenesio et al in view of Dilts et al and further in view of Wendel et al. Applicant respectfully disagrees.

First, as discussed above, Cenesio et al do not disclose using any emulsifier at all. Further, Cenesio et al is directed to a surface sizing composition and teaches that it can be used on the surface of paper that is made using other conventional internal sizing agents. Thus, a person of ordinary skill in the art would have no reason based on the teachings of Cenesio et al to use emulsifiers contained in conventional sizing compositions (that are useful for internal sizing) and include them in the disclosed surface sizing compositions of Cenesio et al. It is submitted that one of ordinary skill in the art would have no reason to include any emulsifier in the surface sizing compositions of Cenesio et al (based on the teachings of Cenesio et al) and even less reason to include a special kind of emulsifier as claimed herein, i.e. an oxyalkylene phosphate ester or salt.

Second, both Dilts et al and Wendel et al are very general in respect of possible emulsifiers and do certainly not point at ethoxylated phosphate esters as being preferred. Applicant respectfully submits that picking a very narrowly defined group of emulsifiers among the vast number of emulsifiers recited in the prior art could not have been obvious to a person skilled in the art in the absence of any particular reason to do so. In the present case there was no reason to believe that the instantly claimed group of emulsifiers would be efficient for stabilizing compositions comprising a mixture ketene dimers or multimers with co-polymers of styrene or substituted styrene.

Considering the cited references as a whole one of ordinary skill in the art would understand that: 1) Cenesio et al do not disclose using any emulsifier at all; 2) Wendel et al prefer using no emulsifier and if an emulsifier is to be used, a cationic emulsifier is preferred; 3) Dilts et al disclose a great number of surfactants but do not point out anyone as being suitable for polymers; and 4) based on the teaching of Cenesio et al, as the sizing compositions (or Wendel and Dilts) are both useful as internal sizing agents, one of ordinary skill in the art would merely appreciate that they could be used (as internal sizing agents) in addition to the surface sizing composition of Cenesio et al and not to pick and choose components (emulsifiers) of those compositions to arbitrarily add them the surface sizing composition of Cenesio et al (which does not use an emulsifier). It is respectfully submitted that a person skilled in the art faced with the above information would have no incentive to pick an oxyalkylene phosphate ester or salt as an emulsifier in a composition comprising a ketene dimers or multimer and copolymers of styrene or substituted styrene with at least one other kind of ethylenically unsaturated monomer. In contrast, it appears that the present invention can only be arrived at by means of hindsight consideration. Thus, without any reason from the prior art as a whole or from common general knowledge a selection

of an oxyalkylene phosphate ester or salt as an emulsifier in such a composition cannot have been obvious to a person skilled in the art.

It is respectfully submitted that the cited references merely disclose the possibility of using any emulsifier selected from a broad range of different emulsifiers, as discussed above, without any suggestion to modify their teachings to arrive at the claimed invention. A "determination of obviousness cannot be based on the hindsight combination of components selectively culled from the prior art to fit the parameters of the patented invention." *Crown Operations*, 62 U.S.P.Q.2d at 1922 (*quoting ATD Corp. v. Lydall, Inc.*, 159 F.3d 534, 546, 48 U.S.P.Q.2d 1321, 1329 (Fed. Cir. 1998)). There must be a teaching or suggestion in the prior art, within the nature of the problem to be solved, or within the general knowledge of a person of ordinary skill in the field of the invention, to look to particular sources, to select particular elements, and to combine them as combined by the inventor. *Id.* at 1922. In *Grain Processing Corp. v. American Maize-Prods. Co.*, 840 F.2d 902, 907 (Fed. Cir. 1988), the Federal Circuit warned that care must be taken to avoid hindsight reconstruction by using the present application as a guide through the maze of prior art references, combining the right references in the right way so as to achieve the result of the claimed invention.

Regarding the instant case, Applicant submits that there is no reason based on the cited references to combine them in the manner presently claimed and the only reason one skilled in the art would arrive at the presently claimed invention is using the present application as a blueprint.

Applicant respectfully submits that, in order to obtain the dispersion as presently claimed, which includes using specific emulsifiers for the claimed dispersion (that includes both the specific cellulose reactive and cellulose no-reactive sizing agents), one would have to pick and choose individual aspects from the various teachings in the cited references and then select the specific claimed emulsifier, in the absence of any teachings or suggestions to do so. It is respectfully submitted that the only way to accomplish this, is with the improper use of hindsight.

Further, with respect of claims 2, 9, 13, 15 and 18 it is submitted that none of the documents provide any reason to include a cationic organic compound having a weight average molecular weight less than about 10000.

The Office Action contends that Dilts et al disclose that blends of surfactants can be used and that quaternary salts of trialkyl amines are disclosed as suitable surfactants. However, it is respectfully submitted that neither Dilts et al nor any other cited document discloses a combination of oxyalkylene phosphate esters and salts thereof with a cationic organic compound having a

weight average molecular weight less than about 10000. In that regard, Dilts et al recite at col. 14, lines 46-47: "*The sizing emulsion of this invention also suitably may contain at least one surfactant*". However, this is not a disclosure to combine any special kinds of surfactants chosen from among all surfactants that are recited later in the reference. Applicants respectfully submits that a person skilled in the art would not from this disclosure be able to read out that the emulsion could include both an oxyalkylene phosphate ester or salt and a cationic organic compound such as one of the general formula $R_4N^+ X^-$, where each R group, independently of each other, is hydrogen or a hydrocarbon groups having from 1 to 30 carbon atoms, and X is an anion. Therefore, it is respectfully submitted that at a minimum claims 2, 9, 13, 15 and 18 cannot be found to be obvious to a person skilled in the art.

Applicant respectfully submits that the cited references, when read as a whole do not, disclose, suggest or teach that it would be possible or desirable to select an emulsifier, as presently claimed, for stabilizing a dispersion that includes both a ketene dimer or multimer and a styrene cellulose non-reactive sizing agent. Therefore, it is respectfully submitted that the presently claimed invention is not obvious in view of these cited references.

Accordingly, it is respectfully requested that the rejections of claims 1-3, 5, 8, 9, 12-15, 17-22 and 26 under 35 U.S.C. § 103(a), as being obvious over Cenesis et al, in view of Dilts et al and further in view of Wendel et al, be withdrawn.

Claims 10, 11, 16 and 23-25 stand rejected, under 35 U.S.C. §103(a), as being unpatentable over Cenesis et al, in view of Dilts et al, and further in view of Wendel et al, and even further in view of Frölich et al (US 6,306,255). The Applicant respectfully traverses.

First, it is respectfully submitted that since the above claims include all the features of the independent claims they are non-obvious for the same reasons as set out above.

Second, Applicant respectfully submits that Frölich et al do not provide any reason to include any condensated naphthalene or lignin sulfonate as in claims 10, 16 and 24.

Frölich et al disclose a sizing composition comprising a cellulose-reactive sizing agent and a hydrophobically modified dispersing agent, and optionally a non-cellulose reactive sizing agent. Applicant submits that he is unaware of any disclosure by Frölich et al of the presence of copolymers of styrene or substituted styrene or an emulsifier selected from the group consisting of oxyalkylene phosphate esters and salts thereof. This is acknowledged by the Office Action.

Although Frölich et al disclose a combination of a cellulose-reactive sizing agent and cellulose non-reactive sizing agent, Applicant respectfully submits that there is no teaching or

suggestion that a dispersion of high stability could be obtained by selecting an emulsifier as presently claimed. It is further submitted that there is no guidance on how to select an emulsifier from among the thousands of emulsifiers known per se, including those mentioned in Wendel et al, in order to provide a stabile dispersion, as claimed.

Thus, considering that the dispersion of Frölich et al is so fundamentally different from those of Cenesio et al and Wendel et al it is respectfully submitted that it cannot have been obvious to a person skilled in the art to include any condensated naphthalene or lignin sulfonate in a dispersion comprising comprising a ketene dimers or multimer, a copolymer of styrene or substituted styrene and an oxyalkylene phosphate ester or salt thereof. Accordingly, it is respectfully submitted that at least claims 10, 16 and 24 cannot have been obvious to a person skilled in the art.

Accordingly, it is respectfully requested that the rejections of claims 10, 11, 16 and 23-25 under 35 U.S.C. § 103(a), as being obvious over Cenesio et al, in view of Dilts et al, and further in view of Wendel at al, and even further in view of Frolich et al, be withdrawn.

The Office Action indicates that the results (in the present examples) are not commensurate in scope with the broadly claimed subject matter. Applicant respectfully disagrees and submits that the unexpected results are commensurate in scope with the present claims and certainly with claims 24 and 25, which recite specific sizing agents, emulsifier, cationic organic compound, and anionic stabilizer.

IV. Conclusion:

In light of the foregoing, Applicant respectfully submits that the application as amended, including claims 1-3, 5 and 8-26, is now in proper form for allowance, which action is earnestly solicited. If the Examiner has any questions relating to this Amendment or to this application in general, it is respectfully requested that the Examiner contact Applicants' undersigned attorney at the telephone number provided below.

Respectfully submitted,



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